CHAPTER NINE

Database and Travel Model

Every CMA, in consultation with the regional transportation planning agency (MTC in the Bay Area), cities and the county, must develop a uniform database on traffic impacts for use in a countywide travel model.[33] The CMA must approve computer models used for sub-areas, including models used by local jurisdictions for land use impact analysis. All models must be consistent with MTC's modeling methodology and databases.

The purpose of this requirement is to bring a uniform technical basis for analysis to congestion management decisions. This includes consideration of the benefits of transit service and TDM programs, as well as projects that improve congestion on the CMP designated system. The modeling requirement is also intended to assist local agencies in assessing the impacts of new development on the transportation system.

The Alameda countywide travel model is an essential tool to the CMP planning process. The CMP is a forward-looking program, espousing a philosophy of early action to prevent conditions from deteriorating. The model allows the CMA to anticipate the potential impacts of local land development decisions on the Metropolitan Transportation System.

FEATURES OF THE UPDATED COUNTYWIDE MODEL

The CMA released an updated new countywide travel demand model in March 2007. The updated model is expanded from the MTC's Regional Transportation Model (BAYCAST model) of 2005, and provides more detailed traffic analysis zones, road and transit networks and other details within Alameda County. This ensures the consistency with the MTC model. The following are the key elements of the updated countywide model:

- The model now uses Cube software.
- The base year of the model is 2000 and forecast years are 2005, 2015 and 2030.
- Five time periods are included in the model: AM peak 1-hour; PM peak 1-hour; PM peak 2-hour; PM peak 4-hour; and Daily.
- The updated model contains

[33] California Government Code Section 65089(c)

- 2,659 traffic analysis zones (TAZ) an increase of 1,634 zones from the previous EMME2 based model.
- includes more detailed road and transit networks and these networks are compatible with GIS
- incorporates the most recent 2000 census and ABAGs' Projections 2005 land use and socioeconomic data with input from the local jurisdictions
- includes San Joaquin County as an internal area in the countywide model through buffer zones
- includes other Bay Area Counties in more detail by including or retaining MTC's Regional Traffic Analysis Zones (RTAZs) for these counties
- expands MTC's home-work mode choice model by including additional details on transit modes . Transit/walk access and Transit/drive access sub-modes are divided into further sub-modes: transit/walk access mode was divided into local bus, express bus including ferries, light rail, commuter rail and BART; transit/drive access mode into park/ride and kiss/ride .

LAND USE DATABASE DEVELOPMENT

The database developed for use with the countywide travel model is based on data summarized in ABAG's Projections 2005 and incorporated into the MTC's regional model TAZs (RTAZ). The land use and socioeconomic data was allocated to ACCMA model TAZs based upon review and redistribution by the Alameda County jurisdictions. The jurisdictions totals generally stayed within 1% variation from the ABAG totals, but were permitted to redistribute if appropriate. Countywide totals after redistribution remained within plus or minus 1% of ABAG county totals, as required by MTC. By aggregating the projections made for each zone, the CMA can produce projections of socioeconomic characteristics for unincorporated areas of the county, the 14 cities and for the four planning areas for Alameda County.

MODEL DEVELOPMENT

The framework established for the model encompasses the following components:

- Trip generation (forecast of the number of trips by traffic analysis zone);
- Trip distribution (distribution of forecast trips between each traffic analysis zone);
- Modal split of inter-zonal trips (distribution of trips by mode within each traffic analysis zone); and
- Assignment (forecast of trips originating or destined to external zones).

These are the typical model components found in any model whose purpose is to produce simulations of travel-demand based on different assumptions about land use, demographic and transportation characteristics.

Development and validation of the model were predicated on the following concepts.

- Consistency, to the greatest extent possible, with the assumptions and procedures established and used by MTC to produce regional travel-demand forecasts. More specifically, maintaining the same variables in the equations that comprise the trip generation, trip distribution and mode split components of MTC's travel-demand model framework.
- Where necessary (in order to produce validated forecasts of travel on arterials or intra-county transit services), enhance the capacity of MTC's models by incorporating the simulation of certain types of travel not modeled by MTC(More specifically the addition of new transit sub modes).

The model was developed using the CUBE software developed by Citilabs, which is an interactive transportation planning program that produces numerical and graphic representations of travel supply and demand. The model has been structured to provide forecasting detail that adequately addresses the evaluation needs of both countywide and corridor-specific transportation strategies. The countywide model has been developed and validated by:

- Defining a graphic zone structure detailed enough to depict changes in land use and demographics that would affect travel-demand on arterials and intra-county transit systems; and
- Establishing highways and transit networks detailed enough for those types of travel-demand.

In addition, the model incorporates land use and demographics of the nine-county Bay Area based on the ABAG's' Projections 2005 and for San Joaquin County from the San Joaquin County Travel Model. This allows the model to produce travel-demand forecasts that incorporate influences of regional travel-demand on transportation facilities in Alameda County. Travel originating or terminating outside the nine-county Bay Area and San Joaquin County is also taken into account, based on the data from the Caltrans statewide model.

PLANNING AREAS

Alameda County has been subdivided into four areas of analysis, or planning areas. Planning areas are analogous to four of the five MTC super districts in Alameda County.[34] The planning areas are defined as follows:

- Planning Area 1 consists of the cities of Albany, Berkeley, Emeryville, Oakland, Alameda and Piedmont;
- Planning Area 2 consists of San Leandro, Hayward, and the unincorporated areas of Castro Valley and San Lorenzo;
- Planning Area 3 consists of Union City, Newark and Fremont; and
- Planning Area 4 consists of Pleasanton, Dublin, Livermore and the unincorporated areas of east County.

[34] MTC superdistricts 18 and 19 comprise Planning Area 1, while superdistricts 17, 16 and 15 equate to Planning Areas 2, 3 and 4, respectively.

TRAFFIC ANALYSIS ZONE SYSTEM

The traffic analysis zone structure developed for the countywide travel model is a refinement of the 1,454 zone structure MTC uses for their nine-county regional travel model. Traffic analysis zones are small geographical subdivisions of a region. Socioeconomic variables, such as households and employment data, are collected at the traffic analysis zone level for input into the travel-demand models. Ultimately, the auto vehicle trips and number of individual trips on transit ("person trips") will be assigned from each traffic analysis zone onto the highway and transit networks.

The countywide model required disaggregating or splitting the MTC zones into more and smaller traffic analysis zones. Within Alameda County, MTC's zone system was refined to better suit the more detailed highway and transit networks in the countywide model. The new traffic analysis zones nest within the larger MTC zones. This ensures accurate disaggregation of MTC's person trip tables to the traffic zones, and allows direct comparisons between the Alameda countywide model outputs and those of the MTC model.
As a result of this zone refinement effort, the new model contains the following 2,659 TAZs:

- 1404 TAZs within Alameda County
- 159 TAZs in buffer areas (52 in West Contra Costa County, 48 in South Contra Costa County, 26 in San Joaquin County, and 33 in Santa Clara County).
- 1096 TAZs in the remainder of the Bay Area same as the MTC's RTAZs

Maps of the 1404 TAZs within Alameda County, grouped by the four planning areas, are available at the CMA website at-http://www.accma.ca.gov/pages/HomeCongestionMgmt.aspx

TRANSPORTATION SYSTEM NETWORK

The countywide model road network includes the following road types:

- Freeways
- Freeway ramps and metered ramps
- State routes
- Arterial streets
- Collector streets that carry traffic through neighborhoods to adjacent neighborhoods
- Streets that are likely to be analyzed in a local traffic study

The transit network in the countywide model was developed from the MTC model network with refinements to match the additional zonal detail within Alameda County. Highway networks by planning areas are available at the CMA website at -http://www.accma.ca.gov/pages/HomeCongestionMgmt.aspx

MODEL RESULTS

The model produces the following countywide travel information:

- Trip Generation
- Trip distribution
- Modal split of inter-zonal trips for home-based work trips and total trips
- Forecast of trips originating or destined to external zones
- Peak hour LOS and traffic volume projections by segment (2000, 2005, 2010 and 2025)
- Directional miles of congestion, by type of facility (arterial, freeway)
- Mean highway speed
- Transit Accessibility
- Vehicle-miles traveled, by facility and by LOS
- Travel times for selected Origin-Destination pairs

Model output traffic volumes for all roadway segments for all horizon years and all time periods by planning areas are posted on the CMA website at website at http://www.accma.ca.gov/pages/HomeCongestionMgmt.aspx

MODEL ADEQUACY

The model has been tested and validated for 2000 conditions. The validation procedure compared the model outputs to observed traffic volumes and transit ridership data. During validation, adjustments were primarily made to model inputs, such as the road network and base year land uses, rather than calibrated parameters such as trip generation rates or distribution factors. Based on the model calibration, MTC consistency check, and the model validation, the following conclusions were made:

- The countywide model is generally consistent with the MTC model in terms of numbers and types of trips, distribution between the Bay Area Counties, and travel modes
- The model estimates reasonable numbers of vehicles and transit riders to and from Alameda County
- The countywide model estimates 2000 base year traffic on most screen lines and major regional facilities at a level of accuracy sufficient to support evaluation of peak hour traffic patterns on the CMP network; for example, select link analysis.

The model will be further refined, at least biennially, as part of the requirements to update the database to the latest ABAG Projections database. Further, it will be updated using the land use information and network characteristics that will be submitted periodically to the CMA by local jurisdictions as part of the land development impact analysis process of the CMP.